Ex02

Introduction: One of the main obstacles of new comer of Power BI is dealing with relationships. This exercise will guide you to understand the concept of relationships, primary-key, foreign-key, and self-reference by using Excel.

Objective: Define relationships under Data Model and the impacts of relationship to reports.
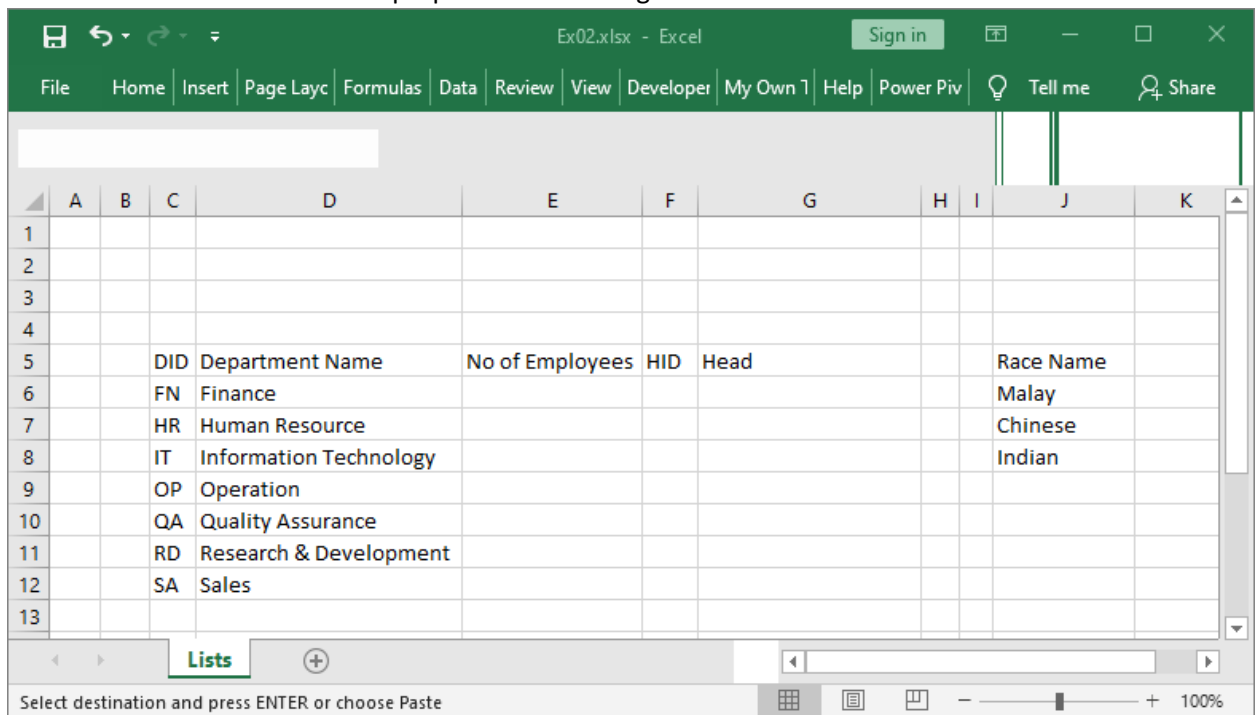
Pre-requisites:

1) Understand what is Named Range in Excel
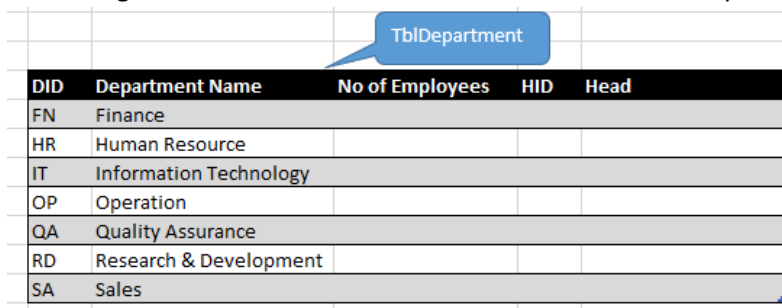2) Understand what is Table object in Excel

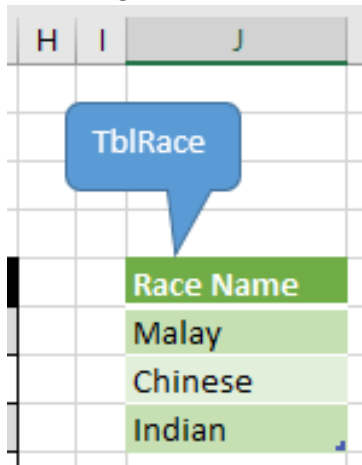**Steps:**

Part-1: Prepare Data Workbook

1. Create a new Excel workbook with name "Ex02.xlsx".
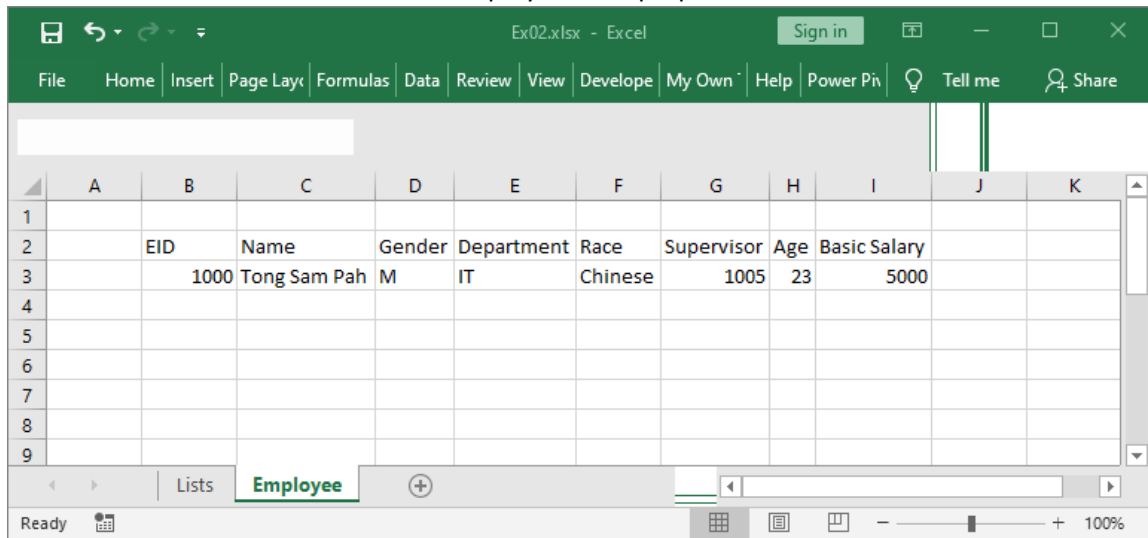2. Rename "Sheet1" as "Lists" and prepare the following data:

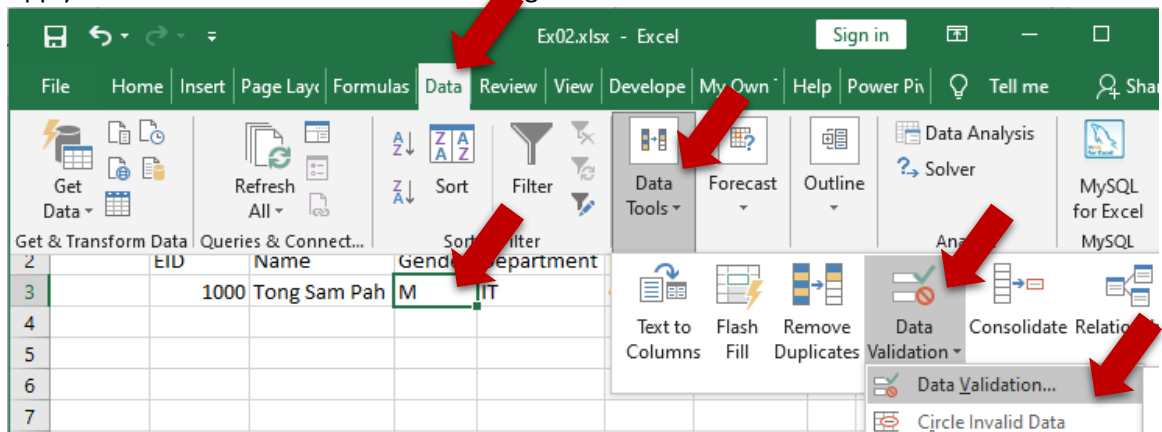3. Mark range C5:G12 to create a new Table with name "TblDepartment":

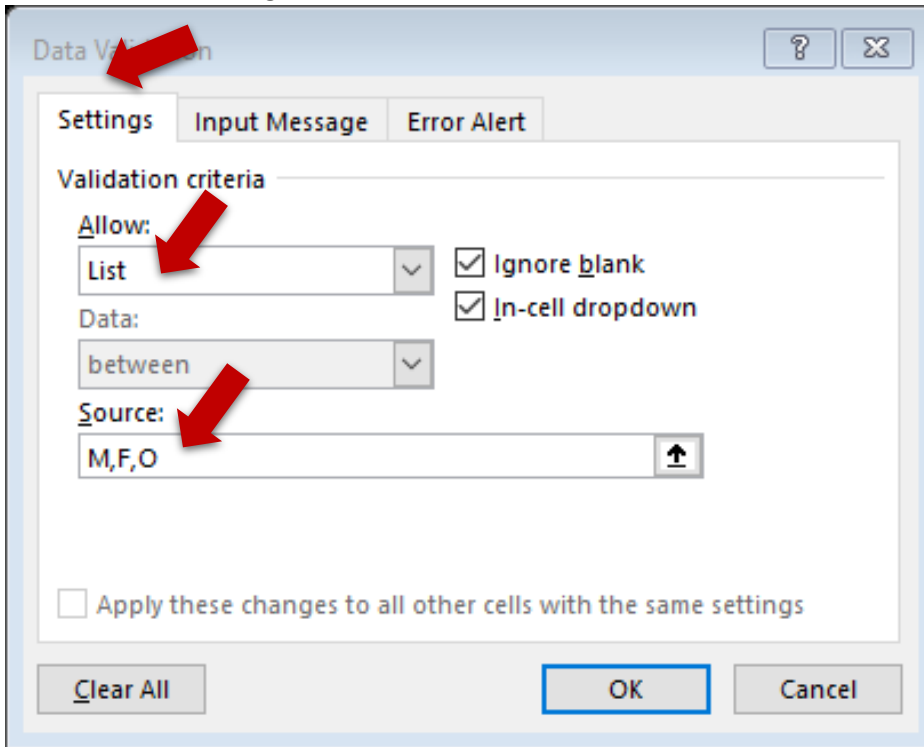4. Mark range J5:J8 to create a new Table with name "TblRace":

5. Create a new worksheet with name "Employee" and prepare the contents as shown below:

6. Apply Data Validation on cell D3 as following:

In the validation dialog box:

7. Apply Data Validation on cell E3 as following:
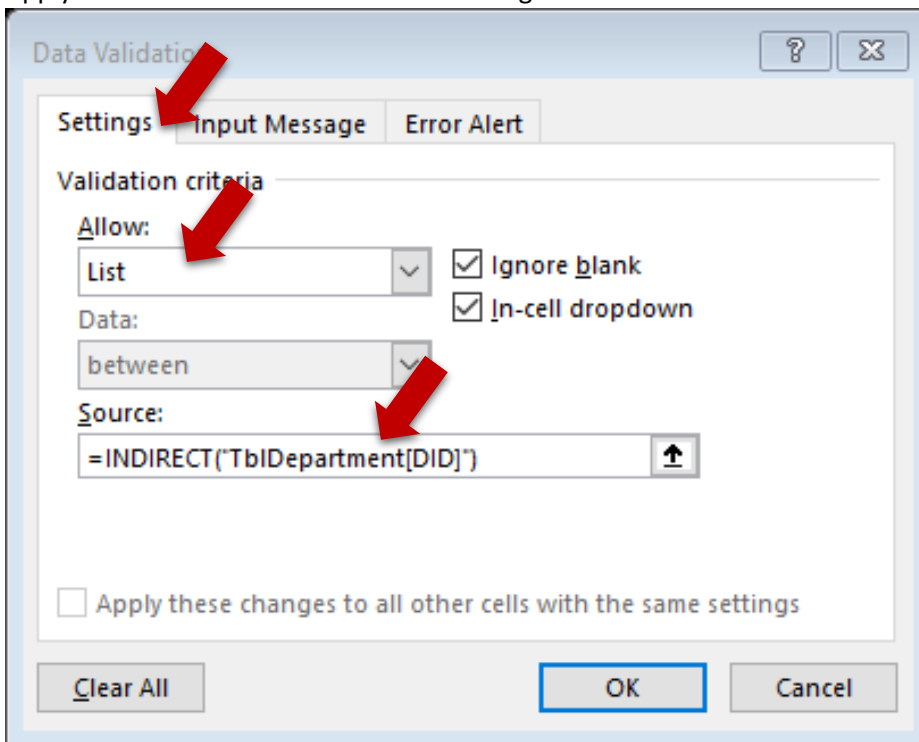
Beware that the Source is: =INDIRECT("TblDepartment[DID]")

8. Apply Data Validation on cell F3 as following:

Beware that the Source is: =INDIRECT("TblRace[Race Name]")

9. Apply Data Validation on cell H3 as following:

10. Apply Data Validation on cell I3 as following:

11. Select range B2:I3:

12. Create a table for this range as TblEmployee:

13. Apply Data Validation on cell G3 as following:

Beware that the Source is: =INDIRECT("TblEmployee[EID]")

14. Complete the table with following data:

	A	B	C	D	E	F	G	H	I
1									
2		EID	Name	Gender	Department	Race	Supervisor	Age	Basic Salary
3		1000	Tong Sam Pah	M	IT	Chinese		23	5000
4		1002	Yong Tau Foo	M	FN	Chinese		25	4800
5		1005	Low Mee	F	IT	Chinese		26	5100
6		1008	Low Shi Fun	F	IT	Chinese		24	4300
7		1010	Ali	M	HR	Malay		29	4700
8		1012	Abu	M	FN	Malay		35	5340
9		1015	Ahmad	M	IT	Malay		40	6500
10		1017	Aaron	M	OP			32	5500
11		1020	Ah Chong	M	SA	Chinese		28	5600
12		1022	Azizi	M	RD	Malay		30	5780
13		1028	Shila Hamzah	F	SA	Malay		25	4325
14		1030	Narayanan	M	FN	Indian		27	4340
15		1032	Fatimah	F	SA	Malay		26	5345

15. Now, complete the supervisor column:

	EID	Name	Gender	Department	Race	Supervisor	Age	Basic Salary
	1000	Tong Sam Pah	M	IT	Chinese	1005	23	5000
	1002	Yong Tau Foo	M	FN	Chinese	1015	25	4800
	1005	Low Mee	F	IT	Chinese	1015	26	5100
	1008	Low Shi Fun	F	IT	Chinese	1005	24	4300
	1010	Ali	M	HR	Malay	1015	29	4700
	1012	Abu	M	FN	Malay	1002	35	5340
	1015	Ahmad	M	IT	Malay		40	6500
	1017	Aaron	M	OP		1015	32	5500
	1020	Ah Chong	M	SA	Chinese	1028	28	5600
	1022	Azizi	M	RD	Malay	1015	30	5780
	1028	Shila Hamzah	F	SA	Malay	1015	25	4325
	1030	Narayanan	M	FN	Indian	1002	27	4340
	1032	Fatimah	F	SA	Malay	1015	26	5345

16. Select cell J2, type the title "Chart", then press enter:

EID	Name	Gender	Department	Race	Supervisor	Age	Basic Salary	Chart
1000	Tong Sam Pah	M	IT	Chinese	1005	23	5000	
1002	Yong Tau Foo	M	FN	Chinese	1015	25	4800	
1005	Low Mee	F	IT	Chinese	1015	26	5100	

A new column will be auto generated (If this is not the case, just right click on cell I2, select "Insert" + "Table column to the right" to add this new column).

17. In cell J3, type "=" then followed by mouse select cell I3. The following formula will be generated:

sor	Age	Basic Salary	Chart
1005	23	5000	=[@[Basic Salary]]

18. Press **Enter** to confirm. The following result appears:

EID	Name	Gender	Department	Race	Supervisor	Age	Basic Salary	Chart
1000	Tong Sam Pah	M	IT	Chinese	1005	23	5000	5000
1002	Yong Tau Foo	M	FN	Chinese	1015	25	4800	4800
1005	Low Mee	F	IT	Chinese	1015	26	5100	5100
1008	Low Shi Fun	F	IT	Chinese	1005	24	4300	4300
1010	Ali	M	HR	Malay	1015	29	4700	4700
1012	Abu	M	FN	Malay	1002	35	5340	5340
1015	Ahmad	M	IT	Malay		40	6500	6500
1017	Aaron	M	OP		1015	32	5500	5500
1020	Ah Chong	M	SA	Chinese	1028	28	5600	5600
1022	Azizi	M	RD	Malay	1015	30	5780	5780
1028	Shila Hamzah	F	SA	Malay	1015	25	4325	4325
1030	Narayanan	M	FN	Indian	1002	27	4340	4340
1032	Fatimah	F	SA	Malay	1015	26	5345	5345

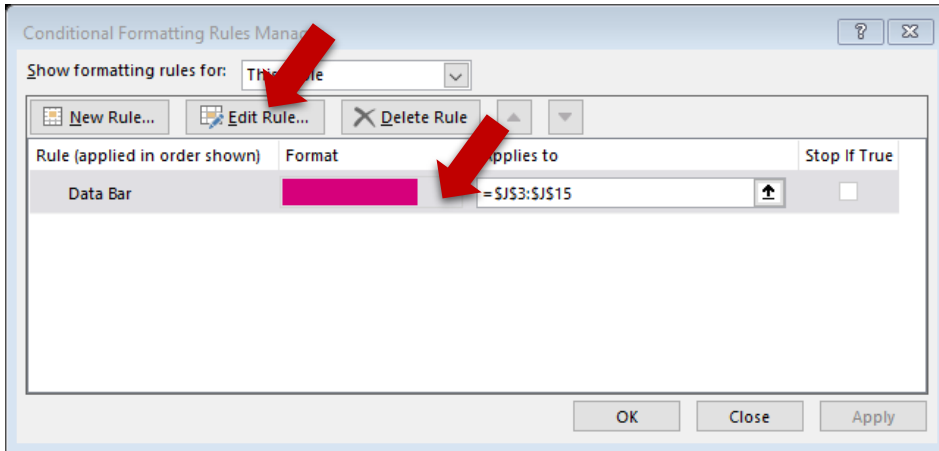19. Select range J3:J15 (Entire Chart column), go to Home ribbon tab, select "Purple Data Bar":
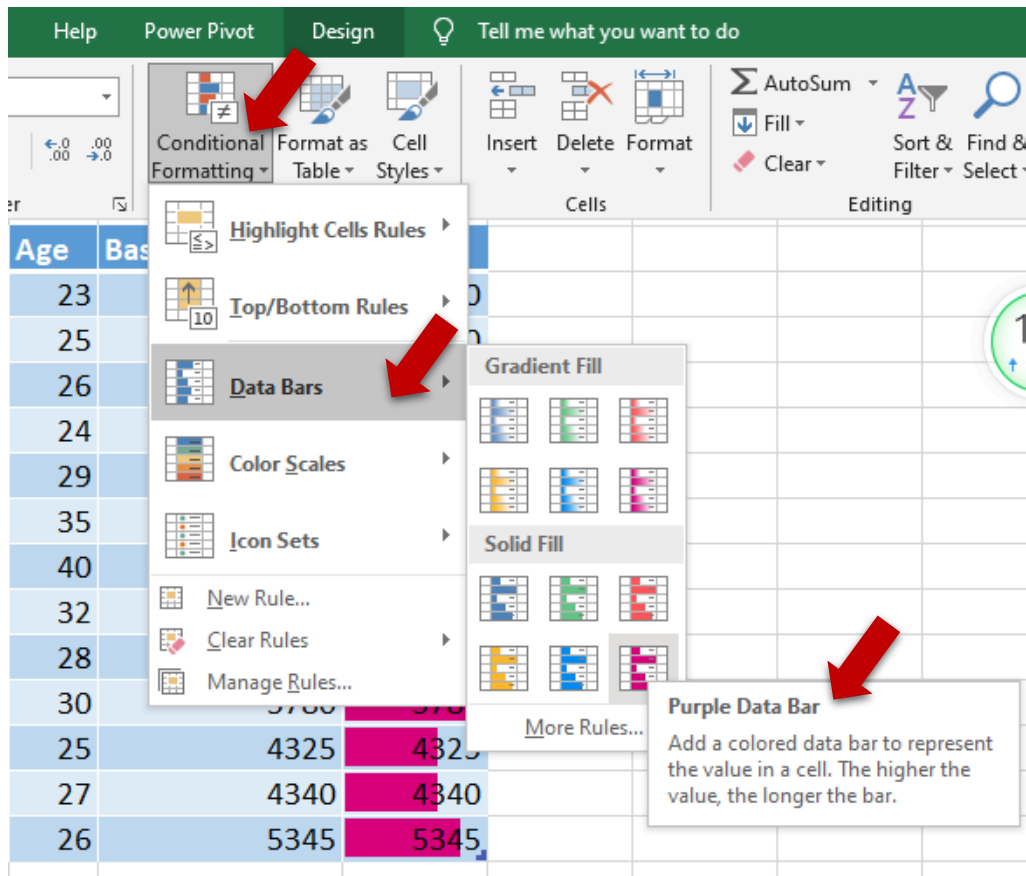
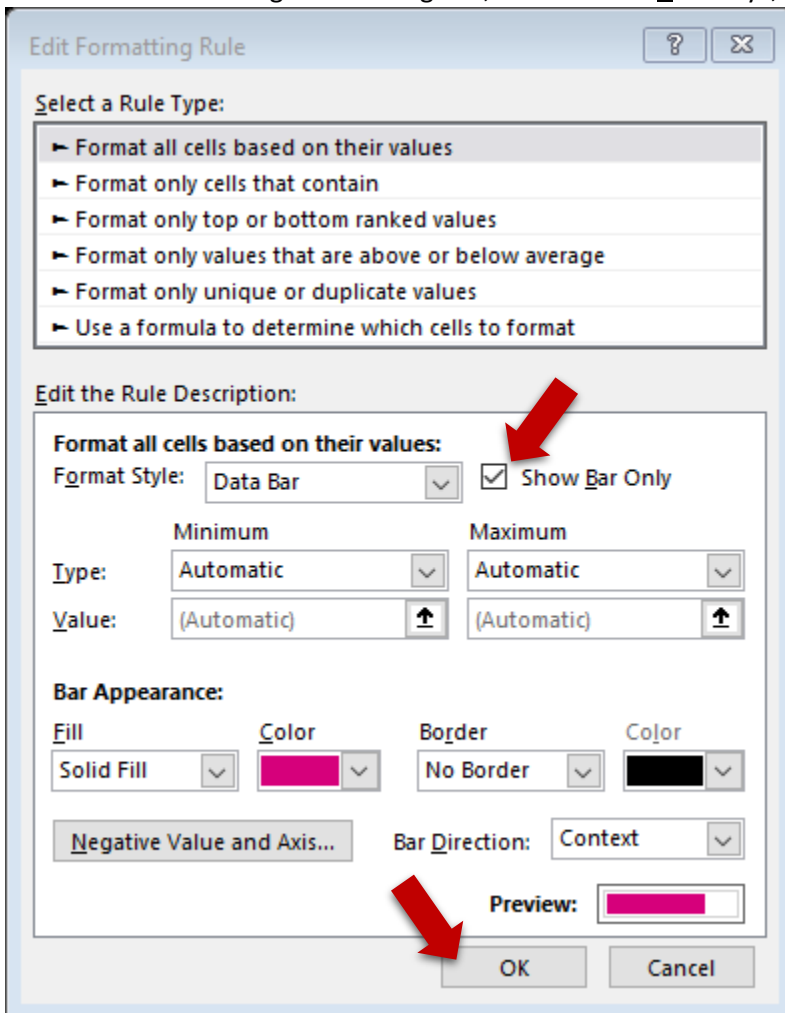20. While still selecting the Chart column, Select "Manage Rules…:

21. Under "Conditional Formatting Rule Manager" dialog box, Select the Data Bar rule, then select "Edit Rule…":

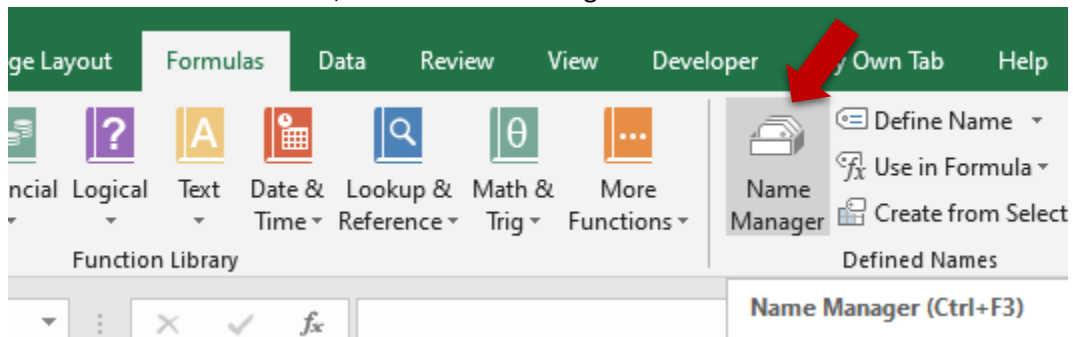22. Under "Edit Formatting Rule" dialog box, check "Show Bar Only", then press OK to end:

When back to "Conditional Formatting Rule Manager" dialog box, press "OK" to end.
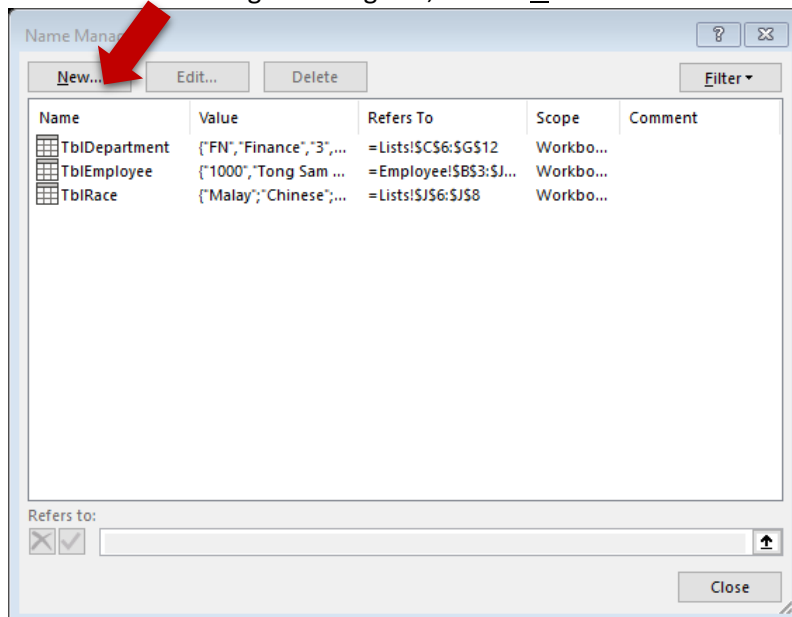
23. The result appears:

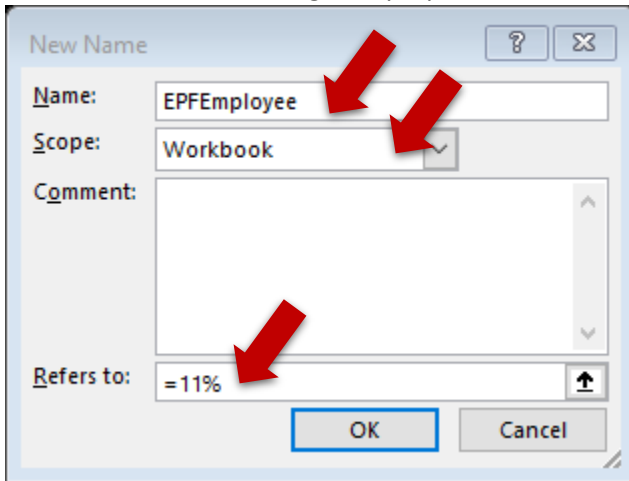| Age	Basic Salary	Chart
23	5000	
25	4800	
26	5100	
24	4300	
29	4700	
35	5340	
40	6500	
32	5500	
28	5600	
30	5780	
25	4325	
27	4340	
26	5345	

24. Go to "Formula" ribbon tab, select "Name Manager":

25. Under "Name Manager" dialog box, select "New…":
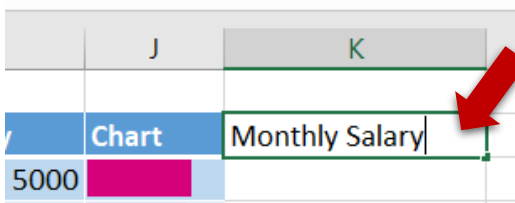
26. Under "New Name" dialog box, prepare the following:

New Name	
Name:	EPFEmployee
Scope:	Workbook
Comment:	
Refers to:	=11%

OK   Cancel

27. Press "OK" to confirm, now a new Name is added:

Name Manager

New...   Edit...   Delete   Filter ▾

Name	Value	Refers To	Scope	Comment
EPFEmployee	{...}	=11%	Workbo...	
TblDepartment	{"FN","Finance","3",...	=Lists!$C$6:$G$12	Workbo...	
TblEmployee	{"1000","Tong Sam ...	=Employee!$B$3:$J...	Workbo...	
TblRace	{"Malay";"Chinese";...	=Lists!$J$6:$J$8	Workbo...	

Refers to:
=11%
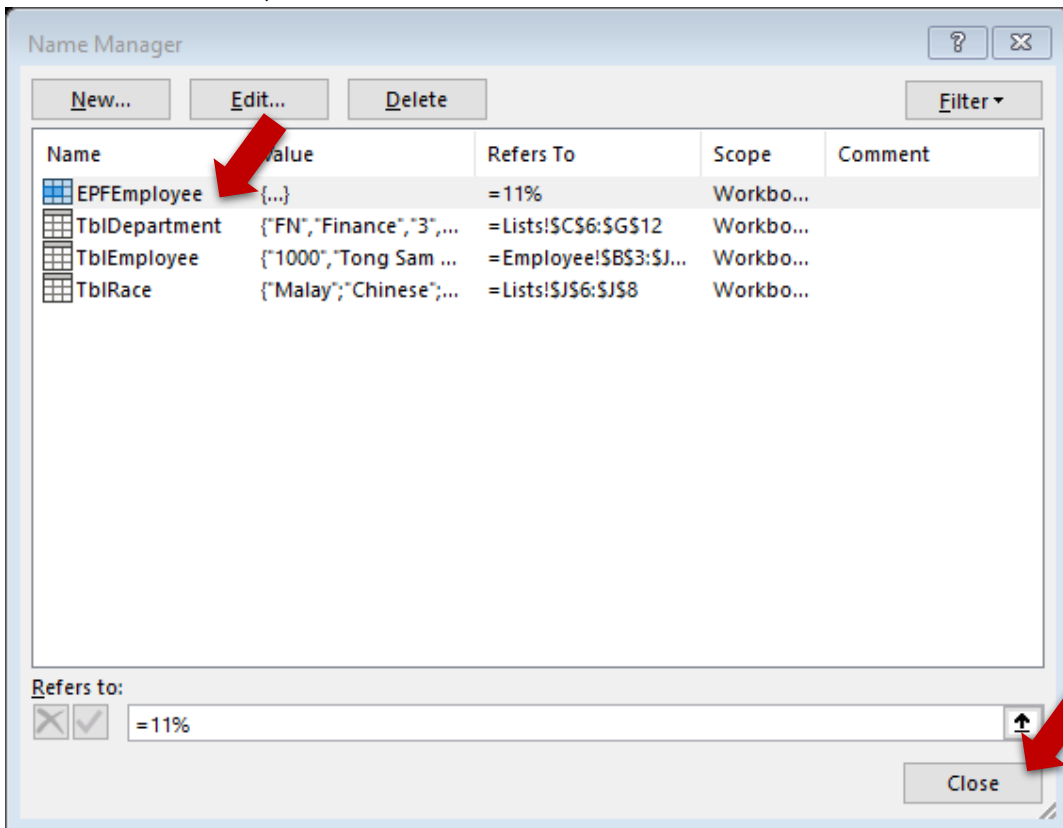
Close

Press "Close" to end the new name creation.

28. Type "Monthly Salary" in cell K2:

	J	K
y	Chart	Monthly Salary
5000		

29. Confirm with "Enter". Now a new column is generated:

	Chart	Monthly Salary	L
000	▮		
800	▮		
100	▮		
300	▮		

30. In cell K3, prepare the formula "":

	I	J	K	L	M
	Basic Salary	Chart	Monthly Salary		
3	5000	▮	=(100%-EPFEmployee)*[@[Basic Salary]]		

31. Press "Enter" generate the column formula:

Basic Salary	Chart	Monthly Salary
5000	▮	4450
4800	▮	4272
5100	▮	4539
4300	▮	3827
4700	▮	4183
5340	▮	4752.6
6500	▮	5785
5500	▮	4895
5600	▮	4984
5780	▮	5144.2
4325	▮	3849.25
4340	▮	3862.6
5345	▮	4757.05

32. Generate a new column "EPF Account":

	J	K	L
	Chart	Monthly Salary	EPF Account
00	▮	4450	
00	▮	4272	

33. Under cell L3, type the formula "=(EPFEmployee+(EPFEmployee+IF([@[Basic Salary]]>5000,2%,1%)))*[@[Basic Salary]]" and press "Enter" to generate column formula:

	J	K	L	M
	Chart	Monthly Salary	EPF Account	
000		4450	1150	
800		4272	1104	
100		4539	1224	
300		3827	989	
700		4183	1081	
340		4752.6	1281.6	
500		5785	1560	
500		4895	1320	
600		4984	1344	
780		5144.2	1387.2	
325		3849.25	994.75	
340		3862.6	998.2	
345		4757.05	1282.8	

34. Format "Basic Salary", "Monthly Salary", and "EPF Account" column with Accounting Format:

	G	H	I	J	K	L	
	Supervisor	Age	Basic Salary	Chart	Monthly Salary	EPF Account	
se	1005	23	$ 5,000.00		$ 4,450.00	$ 1,150.00	
se	1015	25	$ 4,800.00		$ 4,272.00	$ 1,104.00	
se	1015	26	$ 5,100.00		$ 4,539.00	$ 1,224.00	
se	1005	24	$ 4,300.00		$ 3,827.00	$ 989.00	

35. Save and close the workbook.

   Notes: Make sure that you hide all the tables' total row before saving, fail to do so, the total row could be considered as an additional record for the table. This will give you a lot of troubles when loading from Power BI.
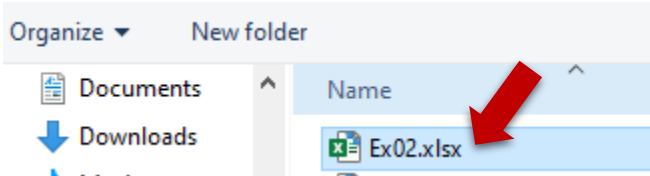
Part-2: Loading Data from Power BI Desktop

36. Crate new Power BI project with name "Ex02.pbix".
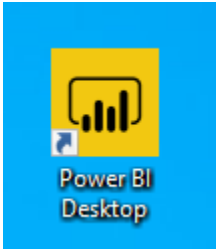
37. From the main UI, select load Excel data source:
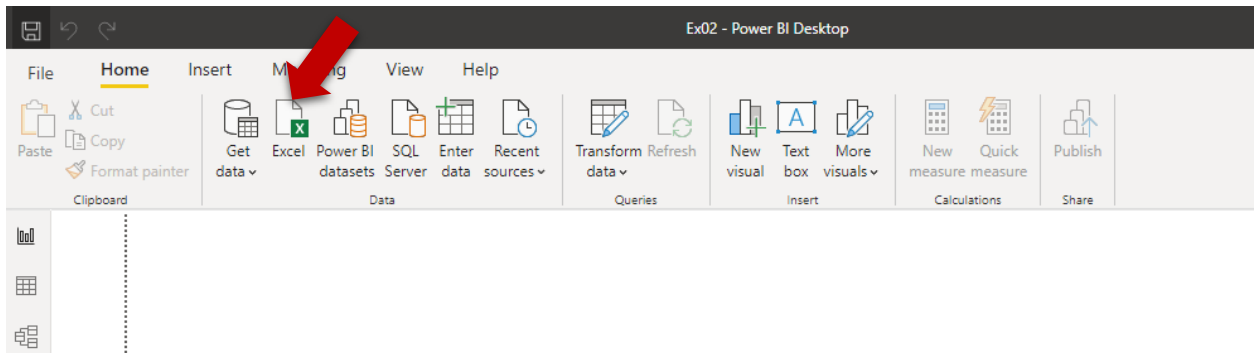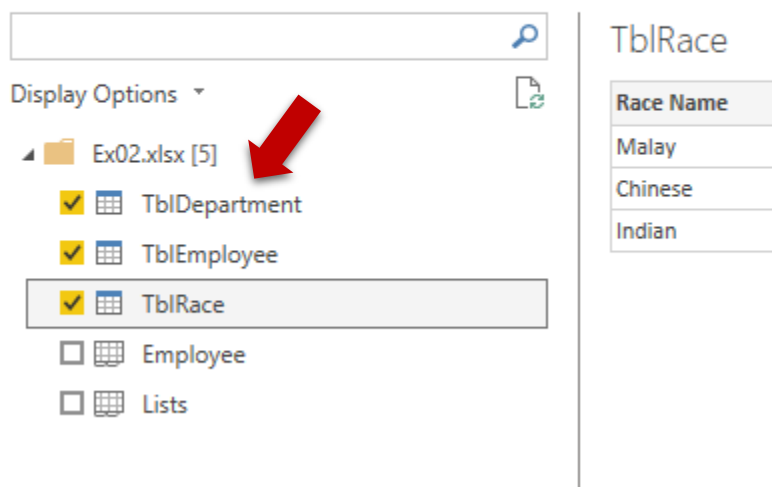

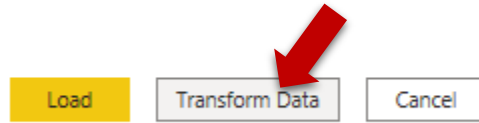38. In the "Open" dialog box, select excel workbook "Ex02.xlsx" you just created:

39. Press "Open", in the "Navigator" dialog box, select the following 3 tables (Don't load at this moment):
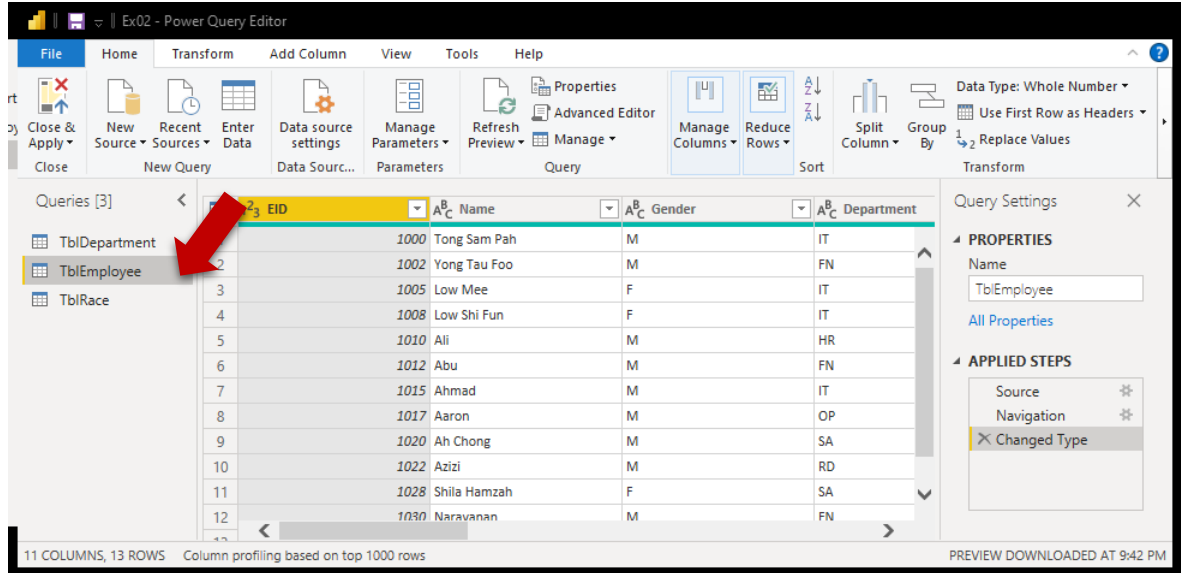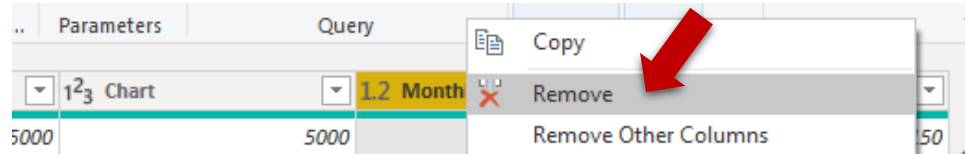

You can preview the data for each table.

40. Still under "Navigator" dialog box, press the "Transform Data" button at the bottom right of the dialog box:


This will open the Query Editor:

41. Select TblEmployee table, right click the column headers to "Remove" the following 3 columns (Need to scroll to far right of the table):
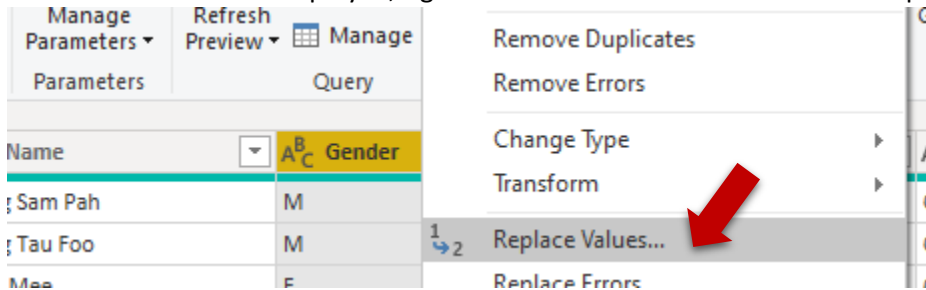   a. Chart
    b. Monthly Salary
    c. EPF Amount

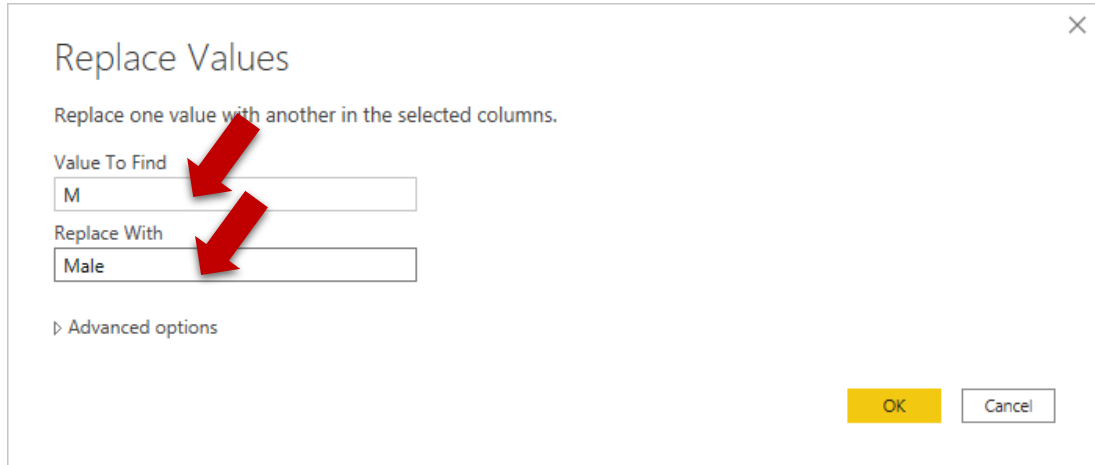**Notes:** These columns are not needed. We can reproduce from Power BI later.

Beware that a new **Applied Step** generated to group all 3 steps as one. (Some steps can be grouped):
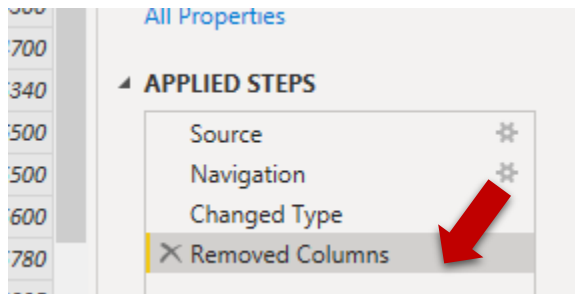
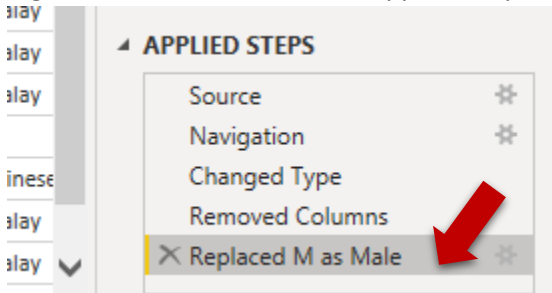42. Scroll to the left of TblEmployee, right click header "Gender" and select "Replace Values…":

43. Under "Replace Values" dialog box, prepare the following:

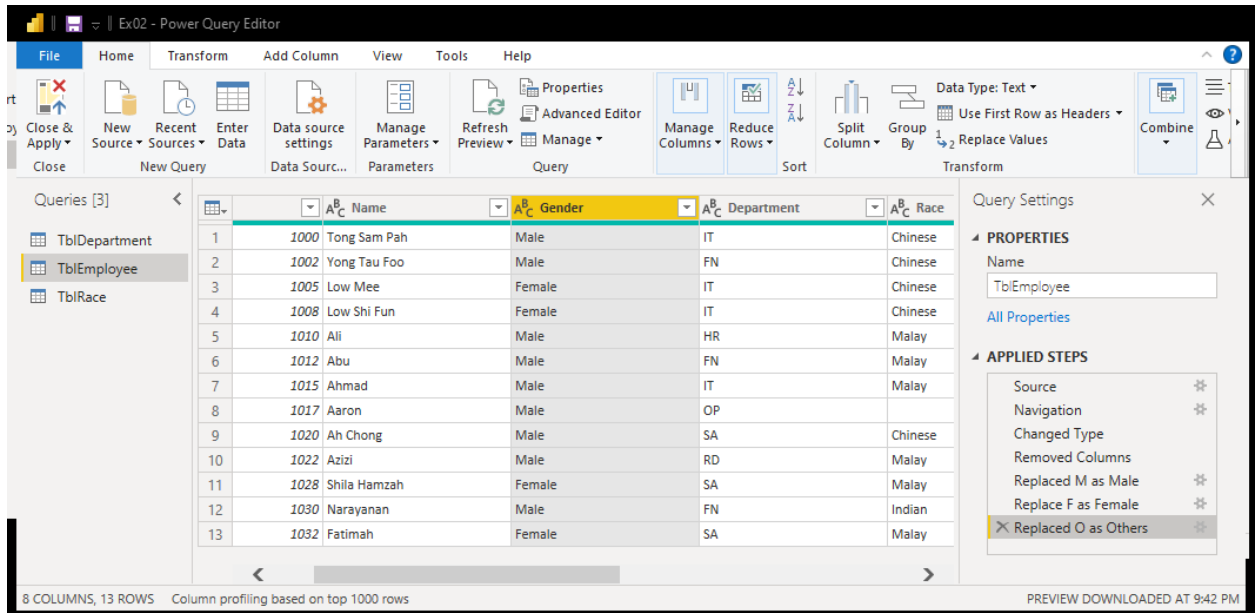44. Press "OK" to confirm. The result:

45. Right click to rename the new Applied Step as "Replaced M as Male":

46. Replace F as Female and O for Others for Gender column again. You will notice that these steps can't be grouped. Rename the generated Applied Steps. It is always a good practice to give meaningful names to the Applied Steps.
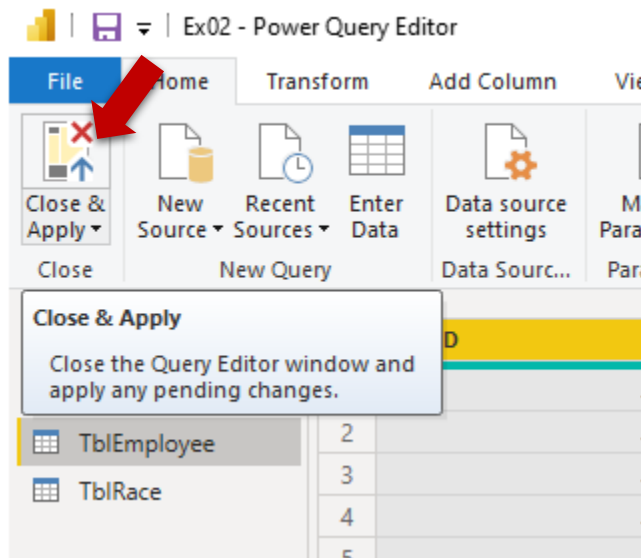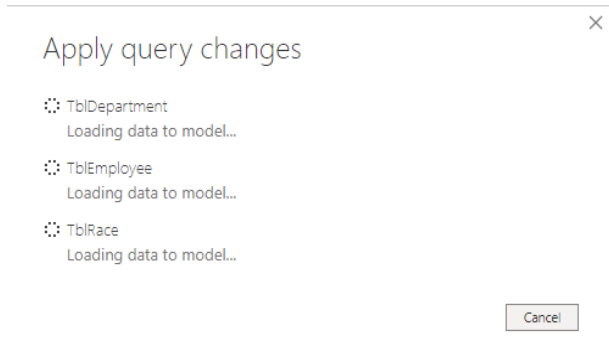
47. Now, the current state is as below:

48. Can you remove "Head" column from TblDepartment?
49. Select the "Close & Apply" to start the loading and transformation:

50. Wait until the process finish:

51. Back to main UI, select the Data View to view the loaded data:

Now, select the Model View:

Noted that there is a relationship auto inferred by the system. This relationship is correct. However, not all the inferred relationships are correct. Check them before proceed. Remove unnecessary relationships.

52. Select the Report View and select Table from Visualizations:
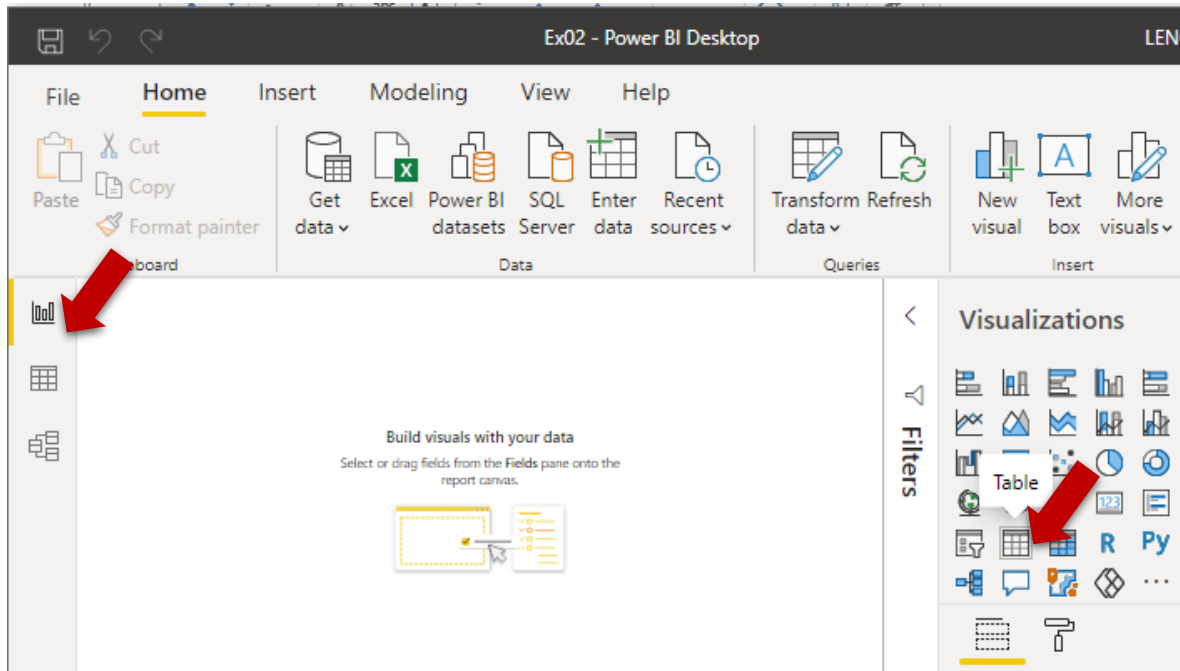
53. While the table visual element is selected, select the following fields from the TblEmployee:
    a. EID
    b. Name
    c. Department
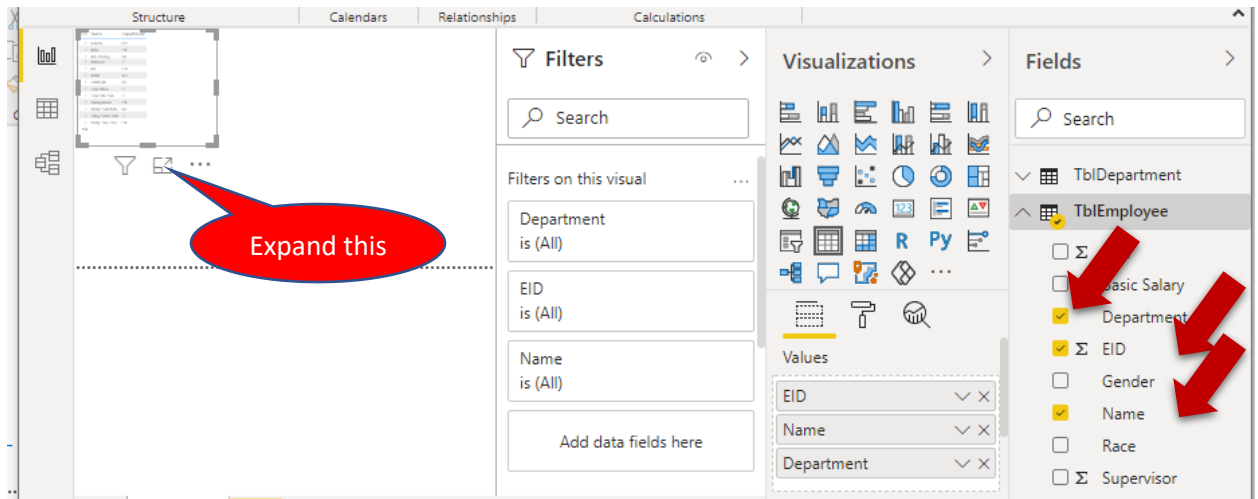
54. You will realize that something not right with the EID field. The reason is the system by default will apply aggregate function "Count" to this column. To fix this problem, under the property EID, select "Don't Summarize":

55. Now, the table visual element should look like this:

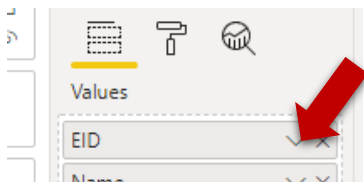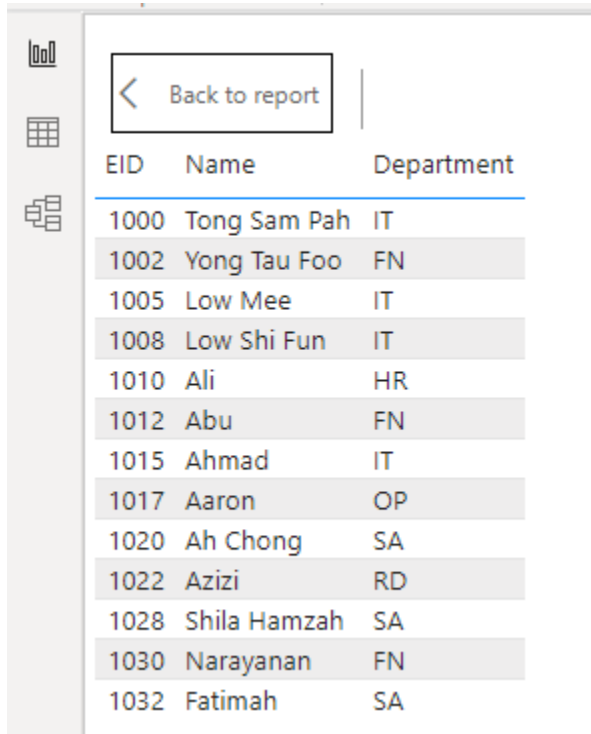| EID	Name	Department
1000	Tong Sam Pah	IT
1002	Yong Tau Foo	FN
1005	Low Mee	IT
1008	Low Shi Fun	IT
1010	Ali	HR
1012	Abu	FN
1015	Ahmad	IT
1017	Aaron	OP
1020	Ah Chong	SA
1022	Azizi	RD
1028	Shila Hamzah	SA
1030	Narayanan	FN
1032	Fatimah	SA

56. How to show the department name instead of Department ID? Try select the "Department Name" from TblDepartment for this table. What happened?

Can't display the visual. See details

Fix this
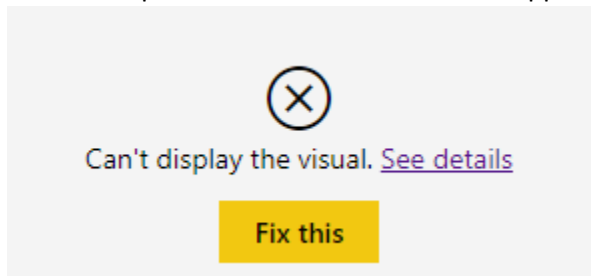
57. Back to the Model View, drag the "Department" field from TblEmployee and drop it to "DID" field of TblDepartment:
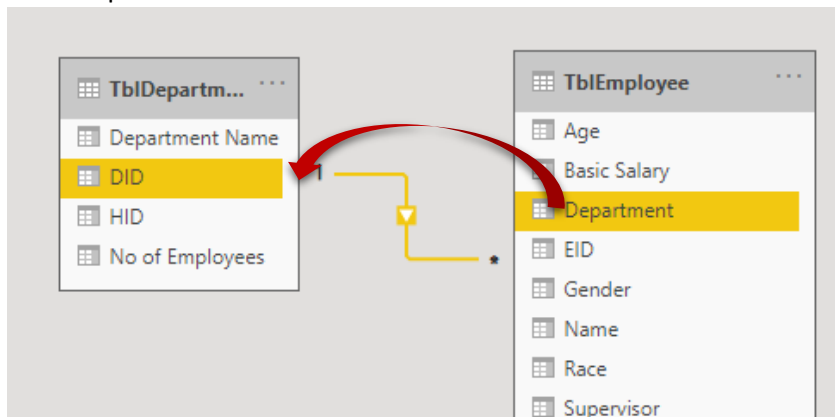
Can you explain the meaning of 1 and * of the two ends of relationship? This is so called the Cardinality/Multiplicity.

58. Switch back to the Report View, now we should get the following result:

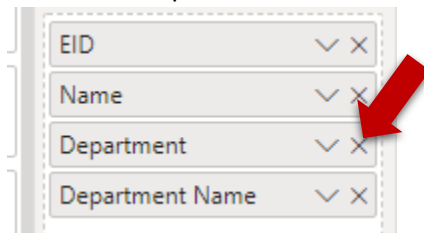| EID	Name	Department	Department Name
1000	Tong Sam Pah	IT	Information Technology
1002	Yong Tau Foo	FN	Finance
1005	Low Mee	IT	Information Technology
1008	Low Shi Fun	IT	Information Technology
1010	Ali	HR	Human Resource
1012	Abu	FN	Finance
1015	Ahmad	IT	Information Technology
1017	Aaron	OP	Operation
1020	Ah Chong	SA	Sales
1022	Azizi	RD	Research & Development
1028	Shila Hamzah	SA	Sales
1030	Narayanan	FN	Finance
1032	Fatimah	SA	Sales

59. Delete the Department column from the table element. It is not needed now:

Observe the table element result.

60. Now drag the "Department Name" and drop it in between "EID" and "Name" field:
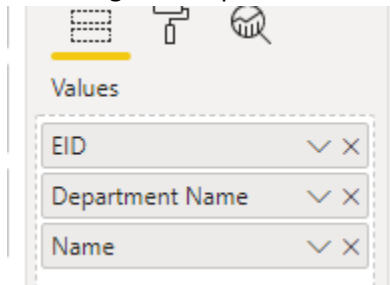
Observe the table element result.

61. Press Undo at the top left corner of the main UI:

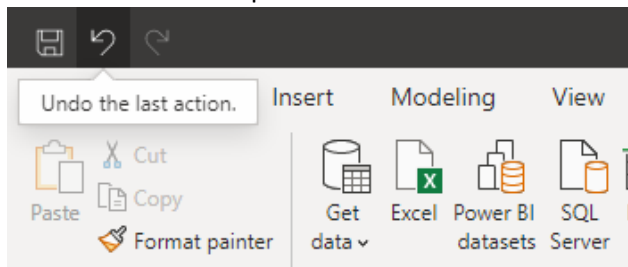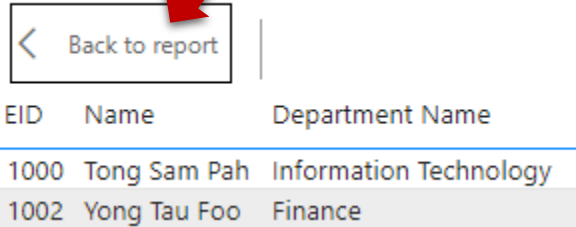62. Select back to report to minimize the table element:

EID	Name	Department Name
1000	Tong Sam Pah	Information Technology
1002	Yong Tau Foo	Finance

63. Back to Model View. The previous relationship between TblEmployee and TblDepartment is about "The information pertaining employee attachment to department". But there should be another relationship between these two tables, right? Guess what 😊
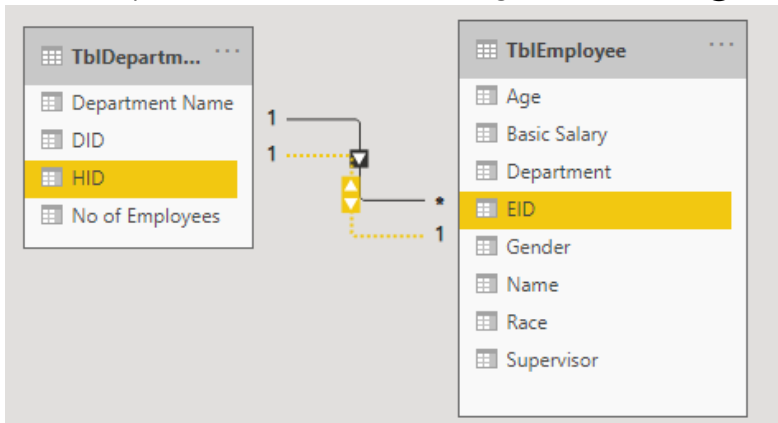
You will aware that this newly created relationship is in dotted form. This means, it is inactive. If you have more than one relationship among tables (including indirect relationships), at any point of time, it should be only one active relationship allowed by the system. Find out how to solve the following problem:

a) How to make the newly created relationship as active relationship? (Hints: right-click relationships to change the properties)

b) The cardinality of the newly created relationship is 1 to 1. This is due to our current data set values. But, in reality, an employee can be given more than one department head roles. What should we do to the model?
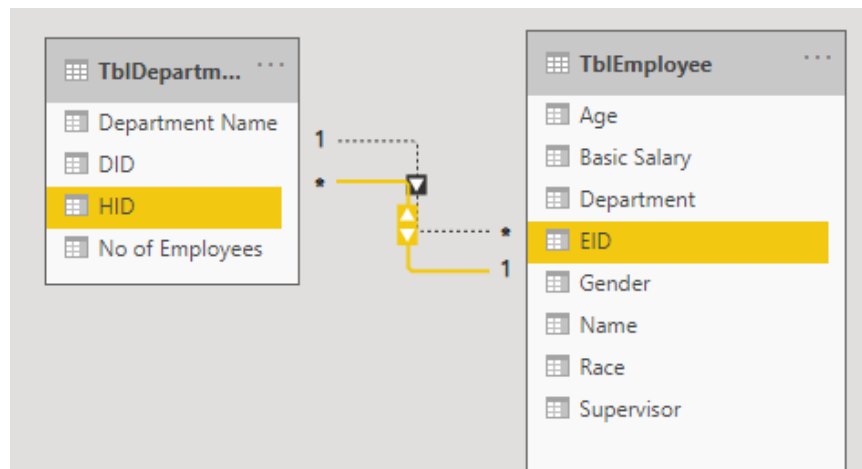
64. Find out how to show the Department name and its department head name on the same table visual element as shown below?

Department Name	Name
Quality Assurance	Aaron
Sales	Abu
Research & Development	Ah Chong
Operation	Ahmad
Information Technology	Ali
Human Resource	Azizi
Finance	Shila Hamzah

65. Consider the following challenges:

Table-1

EID	Name	Department Name
1000	Tong Sam Pah	Information Technology
1002	Yong Tau Foo	Finance
1005	Low Mee	Information Technology
1008	Low Shi Fun	Information Technology
1010	Ali	Human Resource
1012	Abu	Finance
1015	Ahmad	Information Technology
1017	Aaron	Operation
1020	Ah Chong	Sales
1022	Azizi	Research & Development
1028	Shila Hamzah	Sales
1030	Narayanan	Finance
1032	Fatimah	Sales

Table-2

Department Name	Head Name
Finance	Shila Hamzah
Human Resource	Azizi
Information Technology	Ali
Operation	Ahmad
Quality Assurance	Aaron
Research & Development	Ah Chong
Sales	Abu

Table-3

Name	Supervisor
Aaron	Ahmad
Abu	Yong Tau Foo
Ah Chong	Shila Hamzah
Ahmad	
Ali	Ahmad
Azizi	Ahmad
Fatimah	Ahmad
Low Mee	Ahmad
Low Shi Fun	Low Mee
Narayanan	Yong Tau Foo
Shila Hamzah	Ahmad
Tong Sam Pah	Low Mee
Yong Tau Foo	Ahmad

a. What kind information provided by Table-1, 2 and 3?
b. How put both Table-1 and Table-2 together in a single report page when there are from the same set of tables?
c. How to show table-3 that involve "Self-Reference"?

One of the Solution for b and c: Load another set of tables from the same data source, so that maintain single active relationship. Refer to the following Data Model. Try to complete this challenge by yourself.
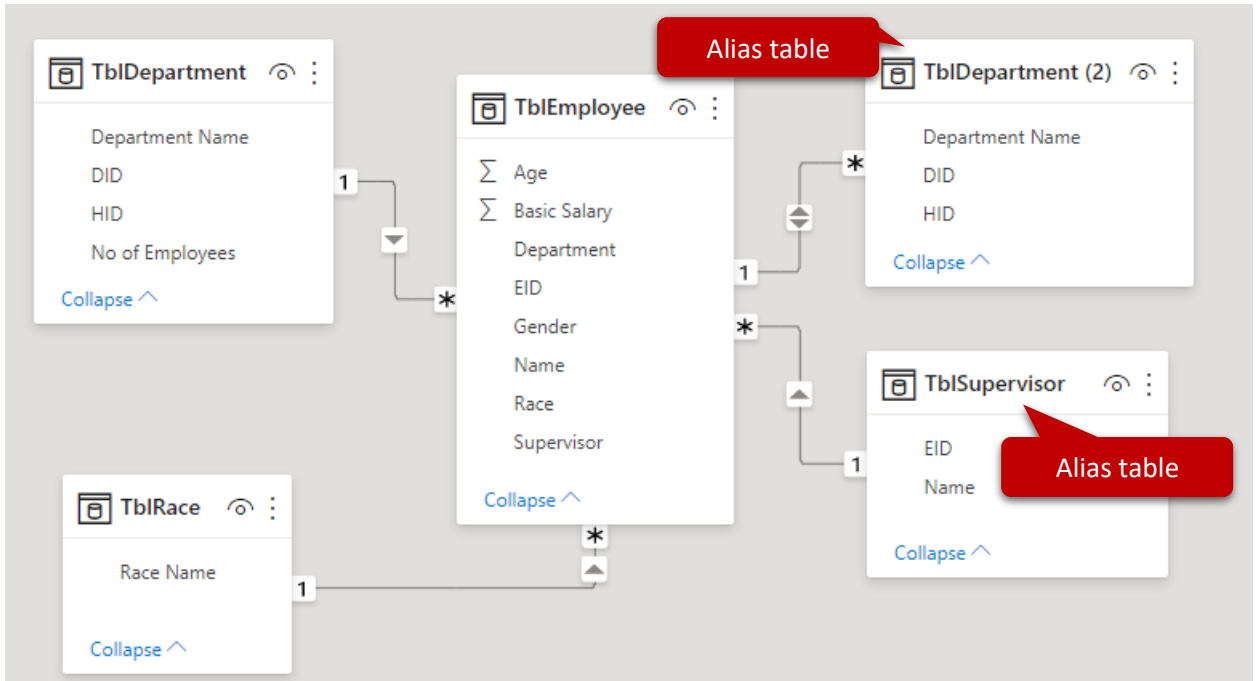
Alias tables = another copy of loading from same data source (Need not have same set of field or transformation) that keep just enough info needed.
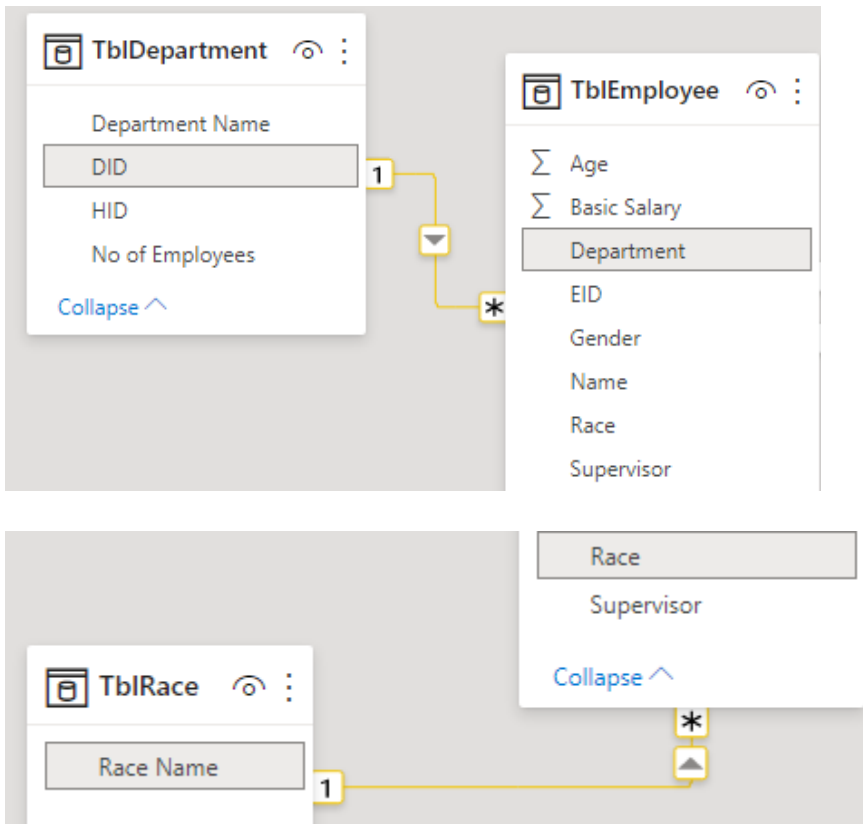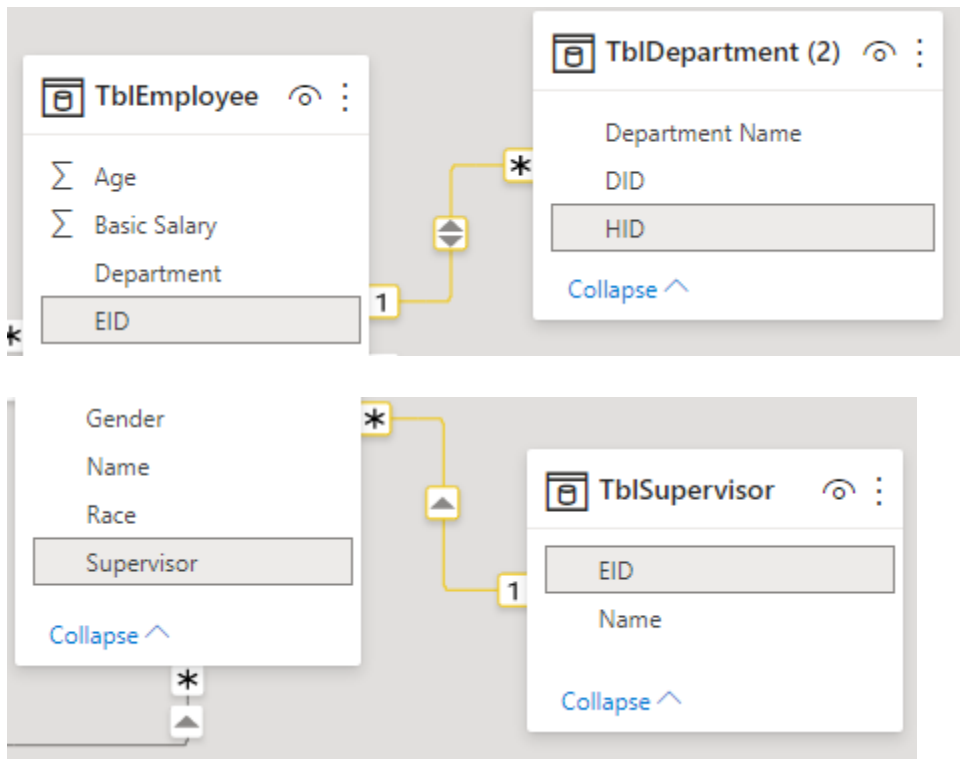
Alternative solution: DAX

Good luck 😊

BTW, we only discuss the relationship direction under Exercise #6 later.